CLAIMS

1. A process for production of a microporous affinity membrane having regioselective affinity for compounds in blood or other biologically active fluids to be removed during purification of blood or said fluids, wherein a microporous affinity membrane substrate having a blood side and a filtrate side is subjected to one or more cycles of plasma ignition in the presence of a gas mixture comprising a functional group containing modifying gas, wherein functional groups are regioselectively bound to pore surfaces of the microporous affinity membrane substrate.

2. The process according to claim 1, wherein a microporous hollow fibre membrane substrate is subjected to the plasma ignition.

3. The process according to claim 1, wherein a microporous flat sheet membrane substrate is subjected to the plasma ignition.

4. The process according to any one of the preceding claims, wherein ligands having affinity for the compounds in blood or other biologically active fluids are bound to the functional groups.

5. The process according to any one of the preceding claims, wherein the functional groups also are regioselectively bound to surfaces on the filtrate side of the microporous affinity membrane substrate.

6. The process according claim 4, wherein the ligands are proteins, peptides, amino acids, carboxylic acids, nucleotides, oligonucleotides, antigens or antibodies, and mixtures of two or more thereof.

7. The process according to any one of the preceding claims, wherein the functional group containing modifying gas comprises an amino, aldehyde, ester, epoxy, hydroxi or sulfonic acid group, preferably an amino group.

8. The process according to claim 7, wherein the functional group containing modifying gas is diaminocyclohexane (DACH) or diethylenetriamine (DETA), preferably diaminocyclohexane.

9. The process according to any one of the preceding claims, wherein the gas mixture also contains a carrier gas.

10. The process according to claim 9, wherein the carrier gas is any gas which is chemically inert during the process, preferably helium, nitrogen, hydrogen, argon or mixtures thereof, most preferably helium.

11. The process according to any one of the preceding claims, wherein the flow rate of gas plasma mixture obtained by the plasma ignition is 0.1-200 sccm/min.

12. The process according to any one of the preceding claims, wherein the proportion between the functional group containing modifying gas and the carrier gas is 1:100 to 1:1, preferably 1:4.

13. The process according to any one of the preceding claims, wherein up to 10 cycles of plasma ignitions are performed.

14. The process according to any one of claims 2 and 4-13, wherein the microporous hollow fibre membrane substrate is enclosed in a housing or a casing throughout the process, preferably a concentric housing or casing.

15. The process according to claim 2 or 14, wherein the gas plasma mixture obtained by the plasma ignition is flowing axially along the outer or inner surface of the microporous hollow fibre membrane substrate.

16. The process according to claim 2, 14 or 15, wherein the microporous hollow fibre membrane substrate is made up of a mixture of polyethylenesulfide and polyvinylpyrrolidone having an inner diameter of 200-1000 μm, preferably about 330 μm, a wall thickness of 20-200 μm, preferably about 110 μm, a pore diameter of 0.1-0.8 μm, preferably about 0.4 μm, and is assembled in modules each

having 1 hollow fibre or bundles or modules of up to more than 1000 fibres.

17. The process according to claim 2 or any one of claims 14-16, wherein the ignition frequency during the plasma ignition is 1 kHz - 13.56 MHz or multiples of 13.56 mHz or microwave frequency, the power is 0.5-20 W, the voltage of the electrodes is 50-500 volts, the pressure is 0.01-10 mbar, the flow rate is 0.1-200 sccm/min, and the gas plasma mixture flow period is up to 20 min.

18. The process according to claim 2 or any one of claims 14-17, wherein the gas mixture is added to the housing or casing space surrounding the outer surface of the microporous hollow fibre membrane substrate in a diffusion controlled way at a pressure of 0.01-50 mbar.

19. The process according claim 2 or any one of claims 14-17, wherein the gas mixture is added to the housing or casing space surrounding the outer surface of the microporous hollow fibre membrane substrate in a laminar flow or convection controlled way at a pressure of 50 mbar-1.1 bar.

20. The process according to claim 2 or any one of claims 14-17, wherein the gas mixture is added to the lumen of the microporous hollow fibre membrane substrate in a laminar or convection controlled way at a pressure of 0.01-50 mbar.

21. The process according to claim 2 or any one of claims 14-17, wherein the gas mixture is added to the lumen of the microporous hollow fibre membrane substrate in a diffusion controlled way at a pressure of 50 mbar-1.1 bar, and wherein the housing space surrounding the outer surface of the microporous hollow fibre membrane substrate is filled with a blocking fluid, preferably polyethylene glycol.

22. The process according to any one of claims 3-13, wherein the microporous flat sheet membrane substrate throughout the process is enclosed in a housing or casing having a first and a second compartment separated from

each other by said membrane substrate, wherein the surface on the filtrate side of said membrane substrate is facing the first compartment and the surface of the blood side is facing the second compartment, and wherein the gas mixture is added to said first compartment and the functional groups during the plasma ignition in the presence of the gas mixture are bound to pore surfaces and the surface on the filtrate side of the microporous flat sheet membrane substrate.

23. The process according to claim 22, wherein the flow rate of the gas plasma mixture obtained by the plasma ignition is 1-100 sccm/min, preferably about 10 sccm/min.

24. The process according to claim 3, 22 or 23, wherein the microporous flat sheet membrane substrate is made up of a mixture of polyethersulfone and polyvinylpyrrolidone having a wall thickness of 20-200 µm, preferably about 110 µm, and a pore diameter of 0.1-0.8 µm, preferably about 0.4 µm.

25. The process according to claim 3 or any one of claims 22-24, wherein the ignition frequency during the plasma ignition is 1 kHz - 13.56 MHz or multiples of 13.56 mHz or microwave, the power is 1-20 W, preferably about 5 W, the voltage of the electrodes is 50-300 volts, the pressure is 0.1-5 mbar, preferably about 0.3 mbar, the flow rate is 1-100 sccm/min, preferably 10 sccm/min, and the gas plasma mixture flow period is up to 30 min, preferably about 5 min.

26. The process according to any one of the preceding claims, wherein excessive gas is evacuated from the housing or casing spaces after the plasma ignition.

27. A microporous affinity membrane produced according to any one of the preceding claims and having regioselective affinity for compounds in blood or other biologically active fluids to be removed during purification of blood or said fluids, wherein said membrane is provid-

ed with functional groups, bound only to the pore surfaces.

28. The microporous affinity membrane according to claim 27, wherein the functional groups are amino groups.

29. The microporous affinity membrane according to claim 27, wherein the functional groups also are bound to the surfaces on the filtrate side.

30. The microporous affinity membrane according to any one of claims 27-29, wherein ligands having specificity for the components in blood or other biologically active fluids to be removed are bound to the functional groups.

31. The microporous affinity membrane according to any one of claims 27-30, wherein it is a microporous hollow fibre membrane or a microporous flat sheet membrane.

32. A microporous affinity membrane according to claim 30, wherein the ligands are proteins, peptides, amino acids, carboxylic acids, nucleotides, oligonucleotides, antigens, or antibodies, and mixtures of two or more thereof.

33. An adsorption device containing the microporous affinity membrane according to any one of claims 27-32.

34. Use of a microporous affinity membrane according to any one of claims 27-32 for therapeutic apheresis.

35. Use of a microporous affinity membrane according to claims 27-32 for diagnostic applications.

36. Use of a microporous affinity membrane according to claims 27-32 for drug development applications.

37. Use according to any one of claims 34-36, wherein blood constituents are not activated during said use.